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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* WARREN M. FARNWORTH and ALAN G. WOOD

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Appeal 2008-005203  
Application 10/799,244  
Technology Center 2100

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Decided: July 21, 2009<sup>1</sup>

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Before LEE E. BARRETT, CAROLYN D. THOMAS, and  
STEPHEN C. SIU, *Administrative Patent Judges*.

SIU, *Administrative Patent Judge*.

DECISION ON APPEAL

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<sup>1</sup> The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

### STATEMENT OF THE CASE

This is a decision on appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1-7 and 14-38. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

#### *Invention*

The invention relates to a computer comprising multiple cards connected to a circuit board through slot connectors wherein circuits on the cards communicate through a separate optical interconnect (Spec. [0010]).

Independent claim 1 is illustrative:

1. A system comprising:

a housing;

a circuit board supported in the housing;

a plurality of slot connectors supported on the circuit board;

a first card in one of the slot connectors;

a first circuit component mounted on the first card, the slot connector coupling the first circuit component to a power supply;

a second card in another one of the slot connectors;

a second circuit component mounted on the second card; and

an optical interconnect coupling the first card to the second card, the first circuit component being configured to communicate with the second circuit component via the optical interconnect, the optical interconnect being entirely supported by the first and second cards, whereby the optical interconnect does not pass through the slot connectors so that interference that could otherwise be caused by signals to and from the first circuit component is impeded.

### *References*

The Examiner relies upon the following references as evidence in support of the rejections:

Kimmel	US 4,704,599	Nov. 3, 1987
Freedman	US 4,839,829	Jun. 13, 1989
Kwa	US 4,863,232	Sep. 5, 1989
Swirhun	US 5,631,988	May 20, 1997

Peter Gillingham, *SLDRAM: High Performance, Open Standard Memory*, IEEE Micro, Vol. 17, No. 16, 29-39 (Nov. 1997) (hereinafter "Gillingham").

### *Rejections*

Claims 1-5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kwa, Swirhun, and Kimmel.

Claims 6 and 7 are rejected under are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kwa, Swirhun, Kimmel, and Gillingham.

Claims 14-16, 18-21, 23, 31-33, and 35-37 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kwa, Kimmel, and Gillingham.

Claims 17, 22, 34, and 38 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kwa, Kimmel, Gillingham, and Freedman.

Claims 24-28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kwa and Swirhun.

Claims 29 and 30 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kwa, Swirhun, Kimmel, and Gillingham.

#### ISSUE 1

Appellants argue that it would not have been obvious to one of ordinary skill in the art to have combined the Kwa and Swirhun references because “Swirhun et al. is not usable” (App. Br. 9) with Kwa, “Kwa teaches away from any such combination” (*id.*), “Kwa itself teaches away from a system that does not provide for automatic alignment of optical connector parts” (*id.* at 11), and “insufficient evidence has been presented to support motivation to combine” (*id.*) the references.

Did Appellants demonstrate that the Examiner erred in finding that it would have been obvious to combine the Kwa and Swirhun references?

#### ISSUE 2

Appellants argue that Kwa teaches away from the combination of Kwa, Swirhun, Kimmel, and Gillingham (App. Br. 16) and from the

combination of Kwa, Kimmel, Gillingham, and Freedman (*id.* at 15). Appellants further argue that these “combination[s] of four references [are] implausible absent improper hindsight reconstruction” (*id.* at 12, 15). The Examiner “disagrees with the unsupported general allegation[s]” (Ans. 17-19), submitting that “it is not apparent what aspects of the combination Kwa actually stipulates not to be used with the system” (Ans. 18-19) and that the “Examiner’s conclusion of obviousness was based on only knowledge within the level of ordinary skill at the time the claimed invention was made” (Ans. 17-18).

Did Appellants demonstrate that the Examiner erred in finding that it would have been obvious to combine the Kwa reference with the Swirhun, Kimmel, Gillingham, and/or Freedman references?

### ISSUE 3

Appellants argue in their Reply Brief that “Gillingham does not disclose a synchronous link DRAM capable of optical communications” (Reply Br. 8).

Did Appellants demonstrate that the Examiner erred in finding that the combination of Kwa, Kimmel, and Gillingham teaches or suggests a synchronous link DRAM capable of optical communications?

### ISSUE 4

Appellants argue in their Reply Brief that “Kimmel does not disclose a co-processor” (Reply Br. 9).

Did Appellants demonstrate that the Examiner erred in finding that Kimmel teaches or suggests a co-processor?

#### ISSUE 5

Appellants argue in their Reply Brief that “Freedman does not disclose a math co-processor capable of communicating with a processor via an optical interconnect” (Reply Br. 10).

Did Appellants demonstrate that the Examiner erred in finding that the combination of Kwa, Swirhun, Gillingham, and Freedman teaches or suggests a math co-processor capable of communicating with a processor via an optical interconnect?

#### FINDINGS OF FACT

The following Findings of Fact (FF) are shown by a preponderance of the evidence.

1. Kwa discloses “an assembly 100 for electrical and optical interconnection of circuit boards [that] comprises a frame for supporting the circuit boards” (col. 4, ll. 8-10; fig. 1).
2. Swirhun discloses an “optoelectronic board [that] comprises an optoelectronic device array that is monolithically formed on a semiconductor chip and aligning means defined on the chip” (col. 3, l. 66 to col. 4, l. 2).

3. Swirhun discloses an optical interconnect extended orthogonally away from the plane formed by the optical interconnect circuitry (figs. 1a, 2a, and 3).
4. Kwa discloses that “[m]ost optical connector parts are provided with screw or bayonet type fittings. . . . The optical connector parts must be mounted where they are manually accessible when the circuit boards are mounted in the frame. . . . This is not always convenient or possible, particularly when the frame carries a large number of densely packed circuit boards” (col. 1, ll. 45-54).
5. Gillingham discloses that “SLDRAM [synchronous link dynamic random access memory] offers high sustainable bandwidth [and] low latency” (p. 29), and that “SLDRAM addresses the requirements of all major high-volume DRAM applications” (p. 30).
6. Kimmel discloses a “central processor and input/output processors” (col. 2, ll. 21-22).
7. “Graphic coprocessors are full-fledged microprocessors that are designed primarily for carrying out graphic operations.” Winn L. Rosch, *The Winn L. Rosch Hardware Bible*, 514 (Sams Publishing, 3d ed. 1994).
8. Freedman discloses that a “math coprocessor . . . may be utilized to enhance floating point computational speeds” (col. 5, ll. 66-68).



## PRINCIPLES OF LAW

### *Obviousness*

The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, and (3) the level of skill in the art. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 416 (2007). If a proposed modification would render the prior art invention being modified inoperable for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984).

### *New Arguments*

“[I]t is inappropriate for appellants to discuss in their reply brief matters not raised in . . . the principal brief[ ]. Reply briefs are to be used to reply to matter[s] raised in the brief of the appellee.” *Kaufman Company v. Lantech, Inc.*, 807 F.2d 970, 973 n.\* (Fed. Cir. 1986). “Considering an argument advanced for the first time in a reply brief . . . is not only unfair to

an appellee but also entails the risk of an improvident or ill-advised opinion on the legal issues tendered.” *McBride v. Merrell Dow and Pharms., Inc.*, 800 F.2d 1208, 1211 (D.C. Cir. 1986) (internal citations omitted).

## ANALYSIS

### *Issue 1*

We agree with the Examiner that it would have been obvious to one of ordinary skill in the art to have combined the Kwa and Swirhun disclosures.

Appellants have failed to provide any evidence to show that combining the teachings and suggestions of Kwa and Swirhun would have entailed anything more than mere rearrangement of known elements to achieve an expected result (i.e., enabling circuit cards inserted into slots in a housing to communicate through optical interconnects) or would have been “uniquely challenging or difficult for one of ordinary skill in the art.” *See Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (citing *KSR*, 550 U.S. at 418-19).

Appellants argue that the combination of Kwa and Swirhun would have been inoperable because “it would not be possible to use the slot connector to couple the first circuit component to a power supply” (App. Br. 9). Kwa teaches a housing for a plurality of circuit cards that communicate with each other through optical interconnects while plugged into a set of slots (FF 1). Swirhun teaches an optical interconnect that is entirely supported on a circuit card (FF 2). Appellants rely on one figure in

Swirhun—figure 4a—to show that the combination of Kwa and Swirhun would be inoperable because use of the optical interconnects blocks use of the slot connectors in this figure.

The teachings and suggestions of Swirhun extend beyond the identified figure. Swirhun also discloses an optical interconnect extended orthogonally away from the plane formed by the optical interconnect circuitry (FF 3). Making use of this teaching from Swirhun would enable simultaneous use of both an optical interconnect and a slot connector, contrary to Appellants' arguments.

Appellants also argue that Kwa teaches away from the combination of Kwa and Swirhun because “Kwa discusses, but rejects, circuit boards having optical connectors that must be manually connected after the circuit board is slid into the card guide.” (Reply Br. 5.) Appellants contend that the main purpose of Kwa is to avoid the risk that operators will forget to mate or unmate optical connector parts (App. Br. 11).

Kwa does teach that circuit boards with optical connectors have disadvantages, such as being inconvenient or, in certain situations, unusable (FF 4). Nevertheless, Kwa does not teach away from the combination of Kwa and Swirhun because for prior art to teach away from a modification, the modification to the must render the prior art invention “inoperable for its intended purpose.” *See In re Gordon*, 733 F.2d at 902.

The intended purpose of Kwa is to enable a plurality of circuit cards in a housing to communicate with each other through optical interconnects while plugged into a set of slots (FF 1). This purpose is not hindered by

placing the optical interconnect circuitry entirely on the circuit cards. While this modification would negate an identified advantage of Kwa's improvement over the prior art, this modification would not render Kwa inoperable for its intended purpose. Thus, Kwa does not teach away from the combination of Kwa and Swirhun.

Appellants also argue that there is "insufficient evidence . . . to support motivation to combine the teachings of Kwa with Swirhun . . . and Kimmel" (App. Br. 11). However, Appellants' arguments are unpersuasive. Kwa teaches a housing for a plurality of circuit cards that communicate with each other through optical interconnects while plugged into a set of slots (FF 1). Swirhun teaches an optical interconnect that is entirely supported on a circuit card (FF 2). These are complementary teachings, both being used according to their established functions to yield a predictable result. *See KSR*, 550 U.S. at 416.

Moreover, Kwa teaches circuit boards with optical interconnects (FF 4). Therefore, one with ordinary skill in the art would have been motivated to look to other teachings of circuit boards with optical interconnects, such as Swirhun (FF 2), when drawing on the teachings and suggestions of Kwa.

In rejecting claims 14-16, 18-21, 23, 31-33, and 35-37, the Examiner did not rely on Swirhun. Thus, the combinability of Kwa and Swirhun is inapposite to the Examiner's decision to reject these claims.

For at least these reasons, we find that Appellants have not sustained the requisite burden on appeal in providing arguments or evidence

persuasive of error in the Examiner's 35 U.S.C. § 103(a) rejections of claim 1, or of claims 2-5 which fall therewith, with respect to Issue 1. For these same reasons, Appellants' arguments for claims 6, 7, 14-16, 18-21, 23-28, 29-33, and 35-37 are unpersuasive with respect to this issue.

*Issue 2*

Appellants assert that Kwa teaches away from the combination of Kwa, Swirhun, Kimmel, and Gillingham and from the combination of Kwa, Kimmel, Gillingham, and Freedman, and allege that the Examiner used improper hindsight reasoning in forming these combinations. These assertions and allegations are made without the support of evidence or arguments. Therefore we find these assertions and allegations unpersuasive of error by the Examiner.

For at least these reasons, we find that Appellants have not sustained the requisite burden on appeal in providing arguments or evidence persuasive of error in the Examiner's 35 U.S.C. § 103(a) rejections of claims 6, 7, 17, 22, 29, 30, 34, and 38 with respect to Issue 2.

*Issue 3*

Appellants' arguments presented in the Reply Brief regarding this issue are considered to be untimely and have been effectively waived by Appellants.

This waiver notwithstanding, Appellants' arguments are unpersuasive. As set forth above, Gillingham discloses a synchronous link DRAM

memory (FF 5) while Kwa discloses optical interconnections of circuits (FF 1). Also, as described above, we find that enabling circuit cards to communicate with one another through optical interconnects would have been obvious to one with ordinary skill in this art to achieve an expected and predictable result of enabling communication among circuits by merely combining or rearranging known elements and processes including known optical interconnect technologies and the high bandwidth and low latency capabilities of SDRAM (FF 5). One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. *See In re Merck & Co., Inc.*, 800 F.2d at 1097.

Appellants have failed to provide any evidence to show that combining SDRAM with the optical communications technologies of the prior art would have entailed anything more than a mere rearrangement of known elements to achieve an expected result (i.e., high bandwidth, low latency access to memory) or that it would have been “uniquely challenging or difficult for one of ordinary skill in the art.” *See Leapfrog*, 485 F.3d at 1162.

For at least these reasons, we find that Appellants have not sustained the requisite burden on appeal in providing arguments or evidence persuasive of error in the Examiner’s 35 U.S.C. § 103(a) rejections of claims 14, or of claims 15-18 which fall therewith, with respect to Issue 3. For these same reasons, Appellants’ arguments for claims 31-34 are unpersuasive with respect to this issue.

*Issue 4*

Appellants' arguments presented in the Reply Brief regarding this issue are considered to be untimely and have been effectively waived by Appellants.

This waiver notwithstanding, Appellants' arguments are unpersuasive. Appellants posit that a "co-processor provides adjunct processing for a processor rather than operating autonomously" (Reply Br. 9), but do not offer evidence that the Examiner's interpretation was unreasonably broad. Moreover, the usage of the term "co-processor" at the time of the invention included auxiliary processors that operated autonomously (FF 7). Thus, Kimmel's disclosure of input/output processors (FF 6) teaches a co-processor.

For at least these reasons, we find that Appellants have not sustained the requisite burden on appeal in providing arguments or evidence persuasive of error in the Examiner's 35 U.S.C. § 103(a) rejections of claims 20, or of claims 21-23 which fall therewith, with respect to Issue 4. For these same reasons, Appellants arguments for claims 36, and for claims 37 and 38 which fall therewith, are unpersuasive with respect to this issue.

*Issue 5*

Appellants' arguments presented in the Reply Brief regarding this issue are considered to be untimely and have been effectively waived by Appellants.

This waiver notwithstanding, Appellants' arguments are unpersuasive. As set forth above, we find that it would have been obvious to one of ordinary skill in the art to combine or rearrange known elements of optical interconnect technologies with math co-processors to achieve the expected result of communication of data at enhanced processing speeds (FF 8) with minimal communications delays. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. *See In re Merck & Co., Inc.*, 800 F.2d at 1097.

Appellants have failed to provide any evidence to show that combining math co-processors with the optical communications technologies of the prior art would have entailed anything more than a mere rearrangement of known elements to achieve an expected result (i.e., faster computation speeds with minimal communications delay) or that it would have been "uniquely challenging or difficult for one of ordinary skill in the art." *See Leapfrog*, 485 F.3d at 1162.

For at least these reasons, we find that Appellants have not sustained the requisite burden on appeal in providing arguments or evidence persuasive of error in the Examiner's 35 U.S.C. § 103(a) rejections of claims 17, 22, 34, and 38 with respect to Issue 5.

### CONCLUSIONS OF LAW

Based on the findings of facts and analysis above, we conclude that Appellants have failed to demonstrate:



1. that the Examiner erred in finding that it would have been obvious to combine the Kwa and Swirhun references (Issue 1);

2. that the Examiner erred in finding that it would have been obvious to combine the Kwa reference with the Swirhun, Kimmel, Gillingham, and/or Freedman reference (Issue 2);

3. that the Examiner erred in finding that the combination of Kwa, Kimmel, and Gillingham teaches or suggests a synchronous link DRAM capable of optical communications (Issue 3);

4. that the Examiner erred in finding that Kimmel teaches or suggests a co-processor (Issue 4); and

5. that the Examiner erred in finding that the combination of Kwa, Swirhun, Gillingham, and Freedman teaches or suggests a math co-processor capable of communicating with a processor via an optical interconnect (Issue 5).

#### DECISION

We affirm the Examiner's decision rejecting claims 1-7 and 14-38.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

msc

Appeal 2008-005203  
Application 10/799,244

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